

ABSTRACT

The method for the fabrication of nano scale temperature sensors and nano scale
5 heaters using focused ion beam (FIB) techniques. The process used to deposit metal nano
strips to form a sensor is ion beam assisted chemical vapor deposition (CVD). The FIB Ga^+
ion beam can be used to decompose $\text{W}(\text{CO})_6$ molecules to deposit a tungsten nano-strip on a
suitable substrate. The same substrate can also be used for Pt nano-strip deposition. The
precursors for the Pt can be trimethyl platinum $(\text{CH}_3)_3\text{Pt}$ in the present case. Because of the
10 Ga^+ beam used in the deposition, both Pt and W nano-strips can contain a certain percentage
of Ga impurities, which we denoted as Pt(Ga) and W(Ga) respectively. Our characterization
of the response of this Pt(Ga)/W(Ga) nano scale junction indicates it has a temperature
coefficient of approximately $5.4 \text{ mV}/^\circ\text{C}$. This is a factor of approximately 130 larger than the
conventional K-type thermocouples.